

Helping Gifted Students Learn From and Learn With Technology

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Technological innovations touch all aspects of our lives. Not only are new technologies emerging every day, older technologies are being combined in new ways. Technology is changing the way we work, how we communicate with each other, and how we learn. Within the context of providing learning opportunities for gifted children, technology presents (a) extensive sources for access to more advanced content, as well as communication with experts in various disciplines; (b) contexts for developing and applying critical and creative thinking skills; and (c) tools for constructing and sharing sophisticated products much like practice professionals use (Siegle & Mitchell, 2011).

Our goal with technology ought to be to help students govern their learning by providing them with opportunities to gather information, organize it in meaningful ways, and share it with others. In this way, students are actively engaged in using technology as a productive tool that not only guides their learning, but also demonstrates what they have learned. In the process, they are learning from and with technology.

PHASES OF TECHNOLOGY IMPLEMENTATION

During the last 3 decades, we have moved through three distinct stages of computer use in classrooms (Valdez et al., 2000). Initially, teachers saw computers as an opportunity to automate print. This often resulted in drill-and-practice programs that resembled self-correcting worksheets. The novelty and game-like format of many of these programs motivated students to use them. Although these innovations in the early 1980s eased a teacher's burden of correcting papers and provided students with immediate feedback on their progress, the programs did little to promote student innovation and creativity.

In the 1990s, a shift occurred in technology use in education. This shift was driven by the development of productivity tools for business. Educators shifted computer use in the classroom from a delivery instrument to a productivity tool. Word processing was the first of these tools to become a staple of educational computing; spreadsheets and presentation tools followed. One of the tools, the database, never gained the popularity in classrooms that it held in the business world. Interestingly, databases now drive most of the technology all of us use today.

Tools were also emerging that allowed students to develop more professional-looking and innovative products. These included sound

and video products, as well as posters, documents, and web pages and afforded students with opportunities to be more creative in developing and sharing their ideas. Students were now beginning to function as practicing professionals in various disciplines. The Internet also began to change the processes of information-gathering

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and communication, and students started collecting data from a variety of online sources, analyzing and organizing this information, and creating impressive multimedia projects that communicated their understanding of the material.

The third phase, now in its infancy, features data-driven virtual learning. The key feature of this phase is data collection and analysis for a specific purpose in a particular setting and content area. Students determine what data they will need to solve a particular problem or answer a specific question, where they will find these data, and how they will analyze the data to reach a reasonable solution to their problem. Digital data are expected to surge fivefold in the next 3 years, which opens new worlds of discovery for data sleuths (Lohr, 2009) and makes the skills of finding and using data to address problems a paramount 21st century skill.

The first phase of technology use that was described above represents "learning *from* technology" (Reeves, 1999), which implies that the students

are receptacles in a learning process in which technology is used to teach or remediate basic skills. Typically, technology in this arena consists mainly of computer tutors or learning/CD-ROM software.

The second and third phases described above fall under the "learning *with* technology" umbrella (Reeves, 1999), which implies that students are active participants in the learning process. The learning with technology category employs computers as a medium through which students can access a wealth of other knowledge and describes the usage of all forms of technology, not just computers, in ways that ensure that the student is an active participant in the learning process. Learning with technology is particularly well suited to gifted students' learning styles.

THE INTERNET AS A RESOURCE

The Internet has had the single greatest impact over the last decade on how we use technology in schools and removes many of the common information resource barriers that, in the past, have frequently created learning ceilings for gifted and talented students.

The Internet provides

the most extensive and accessible collection of information available to students. Since gifted and talented students require greater depth and breadth of information than other students, the Internet is an important resource for them. Many gifted students are passionate about esoteric topics, and they require advanced information that cannot be found in most school and local libraries. The Internet meets their quest for content related to their passion areas above and beyond what is available in textbooks and local libraries. (Siegle, 2005, p. 30)

However, students not only need to know how to find information, they also need to know how to determine whether that information is accurate and how to use and synthesize that information (Leu, Kinzer, Coiro, & Cammack, 2004). Skills in evaluating content resources are especially relevant for gifted students who may be seeking levels of knowledge and understanding about a topic well beyond what their peers and even their teachers will explore. With the plethora of reliable and unreliable information on the Internet, students must develop skills in assessing the material they find on their own. McCoach (2002) suggested that students should be taught to evaluate Web content according to three criteria: reliability, authorship, and purpose. She proposed that students consider some of the following when evaluating Web content:

- Has the Web content been through any sort of review process?
- Does the site provide citations or references for print material that supports the information contained on the site?
- Does the site provide links to other reputable Web sites? Is the site listed within other reputable Web sites?
- Does the site provide contact information?
- Are the author's credentials provided on the site?
- Is the content on a personal Web page, or is it on one that is associated with a reputable organization?

Students' capacity to determine answers to these types of questions is an important learning outcome that cuts across all content areas. The critical thinking skills they develop through this process have implications for students throughout their lives.

VIDEO CONFERENCING

Although most educators primarily view the Internet as a repository of knowledge that is easily accessible through a search engine such as Google, an equally popular feature of the Internet is its capacity to connect users. Video conferencing is one of these options and, with the Internet, is now a simple process that allows students to stretch beyond the four walls of the classroom as

they connect and interact with others. It provides access to expertise and advanced content across a wide variety of fields and can enhance interaction opportunities for gifted students by not only interacting with experts from various domains, but also interacting with other gifted students, an essential option for gifted students in rural or isolated areas.

Student video conferencing projects fall into four categories: courses and tutoring, virtual field trips, multi-school projects, and community events (AT&T Education, 2008). A number of educational opportunities exist within these categories. Because the technology necessary to video conference is inexpensive and easy to implement, the extent of its use is limited only by educators' imaginations. Students can share their interests and communicate firsthand via video with professionals in the field who share their passion for a given topic. Interactive video can extend traditional mentorships, as well as enhance telementoring relationships. Schools can create cooperative agreements to share classroom instruction via video conferencing for students who have outpaced their school's available curriculum. Students can visually experience other students' living environments and cultures within this country and with other countries and can connect with other classrooms and develop joint projects, form book clubs, conduct debates, or set up pen (video) pals to share expertise with each other. In addition, they can interview book authors, politicians, and various other experts. I often have the students in my university classes video conference with the authors of articles we read in the classes.

Skype (<http://www.skype.com>), one of many Internet-based telephone options that are replacing traditional phone service for many people, is currently the most popular free video conferencing option. In addition to the free service for connecting computers to standard phone numbers, the company offers free voice and video calls between personal computers connected to the Internet, which makes it a viable option for educators. In order to use the program, users must create a free account and download and install the Skype software on their computer. This involves selecting a Skype name and password that

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FIGURE 1. Events can easily be broadcast throughout the Internet through the Ustream site.

are used to log into the Skype network. Using these IDs, Skype users call each other through their computers. Users can search the Skype network for friends' Skype names and add these friends to their contacts lists. Calls are made by selecting the desired name in the contact list and clicking on the video call icon. If a computer does not have a built-in video camera, an inexpensive webcam can be installed. Low-end webcams can be purchased for under \$20. Once the account is established and the Skype software installed, free video conferencing is a simple mouse click.

Although Skype requires user registration and software installation, Koowy (<http://www.koowy.com>) does not and can easily be accessed with any computer connected to the Internet. Only a web browser, Flash player (usually installed with the web browser, but free downloads are available from <http://www.adobe.com/products/flashplayer/>), webcam, and microphone are needed. Users simply visit the Koowy site using their Internet browser and type a title for a video chat room they wish to create. The system automatically creates a video chat room for up to 16 people and participants can invite others to join the chat

room by giving them the room's URL. Each participant enters the URL into a web browser or visits the Koowy site and enters the common video chat room name into the entry box to join the video conference. As individuals enter the video chat room, additional video windows appear with their video images. Koowy is one of the most user-friendly, free video conferencing options available; however, there are drawbacks. Unlike Skype, Koowy is an open conference where anyone with the conference address can join; however, users can avoid unwanted intruders by selecting unique, possibly meaningless, conference names. Educators and parents should be aware that the advertisements that appear on the Koowy site may also contain more mature themes. Finally, Skype video quality is superior to Koowy. Given its drawbacks, Koowy is still a viable option for those who do not wish to download and install software or for those who do not wish to register for user identifications and passwords.

Although programs and sites like Skype and Koowy provide two-way video interactions between individuals, Ustream (<http://www.ustream.tv>) allows an individual to broadcast to an audience of thousands, and anyone with

an Internet connection and a camera can broadcast video events. Legions of Ustream users broadcast a wide variety of content, from concerts to sporting events to graduation ceremonies. The program founders met at West Point in 2007 and created a service that allowed servicemen to communicate with their families and friends live, all at once. To access Ustream, users must register a user name and password, but no software needs to be installed and once the free account is established, users simply log into the Ustream website, select "Broadcast Now," and begin broadcasting their video through the Internet. The broadcast can be recorded and stored on the user's Ustream channel for later viewing (see Figure 1). Ustream also offers a free iPad app that allows users to broadcast directly from their iPad, iPod, or iPhone.

Educators should plan for the unexpected when setting up video broadcasts or video conferencing sessions. Using the following tips will ensure a smooth event when video conferencing from a classroom:

- Expect something to go wrong and have a backup plan ready to fill the time scheduled for the video conference.
- Test the equipment prior to the conference and, if at all possible, schedule a brief trial test with the other site or sites.
- Account for different time zones and possible holidays and vacations for those with whom conferences are scheduled.
- Have students conduct background researches before the video conference so they are adequately prepared and do not waste other conference participants' valuable time.
- With multiple participants, state a person's name first before directing a question to him or her.
- Prior to conferencing, inform video conference guests about the students with whom they will be interacting.

- With large group video conferences, use a video projector so students can see the conference more easily. This also allows some flexibility to reposition the webcam. (Siegle, 2008)

CLOUD COMPUTING

Many educators are unaware that a variety of free software options exist, and most of them do not actually require installing software on the user's computer. One such option is cloud computing, a popular technology trend that has been gaining momentum over the last 5 years. Cloud computing uses the Internet and remote servers to maintain data and applications, allowing students and teachers to use applications without installing them on their computers. It also permits access to saved files from any computer with an Internet connection. This technology facilitates more efficient computing by centralizing storage, memory, and processing while enabling a number of individuals to simultaneously work on a project—regardless of their location. The term “cloud computing” is used because the services and storage are provided over the Internet, affectionately known as the “cloud.”

There are four major advantages to cloud computing. First, multiple copies of software applications do not need to be installed on computers around the school, saving installation time and the cost of site licenses. Second, although documents created with these applications can be downloaded to the user's computer, they often are saved on the software provider's server, which means they can be accessed from any computer connected to the Internet. Third, in several cases, the creator of a document can collaborate with others by inviting them to view and even edit the document. People in different locations can interact simultaneously with a single document, eliminating the need for multiple versions of the same document. Finally, in many cases,



FIGURE 2. Citrify offers a simple graphics editing program that students will enjoy using.

each version of the document is saved and previous versions of a document can be retrieved. Some cloud computing options contain all of these features; others contain one or two of them.

Office-Like Options

Google led the charge 5 years ago with its online documents (Google Docs [<http://docs.google.com>]), allowing doc users to create and share word processing, spreadsheet, presentation, drawing, and interactive form documents. Now, other software developers have entered the field. Microsoft (<http://office.microsoft.com/en-us/web-apps>) offers scaled down versions of Word, Excel, PowerPoint, and OneNote, providing users with options for creating files that can be shared on Microsoft's SkyDrive. Students and educators can create Word, Excel, PowerPoint, and OneNote documents through Windows Live (<http://www.windowslive.com>) without having the Office program installed on their computers. Once they create a Windows Live login, they can freely create, edit, save, and share documents without installing any software. After logging into Windows Live, students access files they have saved or create new files and have the ability to share Office docu-

ments with others who have Microsoft Office installed on their computers or those who do not have it installed and are using the free cloud version through Windows Live. Additionally, two people can simultaneously edit the same spreadsheet, Word document, or PowerPoint presentation from different locations through a PC, the Web, or a Windows Mobile phone.

Graphic and Sound Editing

Cloud computing is not limited to traditional Office-like applications. Photographs can easily be edited with Citrify (<http://www.citrify.com>), Splashup (<http://www.splashup.com>), and Pixlr (<http://www.pixlr.com>). The latter two provide more advanced editing features such as layers and filters. With these applications, retouching photographs online is a simple process (see Figure 2). Online sound editing is available at Aviary (<http://www.aviary.com>), which also provides a graphic editing option. Most of these sites do not require a login and password unless the user wishes to save the final work online.

LiveBinders

Organizing the ubiquitous selection of websites teachers may wish to

share with their students is a daunting task. LiveBinders (<http://livebinders.com/>) is a simple solution to organizing and presenting various pieces of information, whether they are website links or files, in one place for easy, accessible sharing. LiveBinders provides an online system that permits teachers to organize information in an electronic, online binder through a series of tabs. The teacher can restrict who has viewing access to the binder and can also allow others editing privileges. Users organize a binder with various tabs and subtabs, and users can select any tab to access the information the binder creator has provided on the pages.

LiveBinders features different layout templates, similar to the templates available for many presentation programs. These templates allow teachers to include written text to accompany the media. The media box of a layout can contain any of the following file formats: .pdf, .jpg, .gif, .ppt, .doc, .txt, or .mov. When websites are inserted, the actual website appears in the media window, so students can view the website and read the teacher instructions without leaving the binder. YouTube videos can be included in a media window, allowing teachers to suggest a list of topics in the textbox for students to consider when viewing a video. Once again, students watch the YouTube video and consider the questions the teacher has proposed without leaving the binder. Teachers can customize binder tabs to differentiate learning for students.

CONCLUSION

There is a wide range of technology that teachers can use to enhance the curriculum and learning for gifted students. Technology tools can provide access to advanced content; opportunities for students to solve challenging, ill-structured problems and to develop critical thinking skills; varied creative

product options; and ways for students to integrate their thinking about concepts to new contexts. The examples of technology tools provided here are a small sample of free options educators have at their fingertips. Educators who fail to embrace technology and its changing nature will fall behind. Worse, their students' motivation

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and learning will suffer. Successful implementation of technology is only limited by teachers' creativity, their understanding of their curriculum, and their willingness to explore the technology tools that surround them. With creative thought, the learning in any classroom can be enhanced with technology to be more relevant and motivating for students and to provide challenging and stimulating tasks that will advance students' skills and learning experiences.

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